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***Traditional Knowledge of the Sea in a Time of Change:
the Caiçara of Ilhabela, Brazil***

(7,807 word count, excluding references)

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Abstract

This research project explores the traditional knowledge of the *Caiçara* artisanal fishermen and women living on the island of Ilhabela, Brazil. Specifically documenting a collaborative engagement undertaken with them, the aim of this research is sharing their observations and concerns. These communities live primarily from small-scale fishing, cultivation of modest crops, sales of a few handcrafted items, and most recently, catering to tourists. The pattern of their lives highlights changing ecological conditions, manifesting the vulnerability of the ecosystem. Their ways serve to magnify many of the world's most pressing concerns about climate change, the need for conservation, the effects of governmental regulation and the (de)valuing of traditional knowledge. The representation — or misrepresentation — of a people to the wider world crucially shapes their fortunes and affects their ability to promote positive conditions in their environment. In recognition of debates in Cultural Geography about the methods, merits and pitfalls of representation, the necessity remains for some type of portrayal of a people's conditions and lived experiences, if for no other reason than to permit them to be politically recognised. Deploying 'more-than-representational' methods [Lorimer, 2005] in sharp focus and through observational, participatory sited fieldwork, this research transcends disciplinary boundaries through collaborative active witnessing. (200 word count)

Keywords

Caiçara, traditional knowledge, artisanal fishing, phenology, material culture, observational ecology

Introduction – A context for fieldwork in the Atlantic coast of Brazil

A traveller recounting an experience of meeting a community for the first time typically relies upon observation and language that attempts to describe and define demarcated identities and

locations. However, to do so runs the risk of depending upon precisely the kind of static definitions rejected by non-representational theorists and challenged by academics in Cultural Geography for whom embodied knowledge, and the phenomena of the everyday, stand as self-signifying. Decades-long debate by cultural geographers (Paasi, 1991)¹ and geo-philosophers (Casati, Smith, and Varzi, 1998)² has created an entire discourse around ontologies of geographic representation. More recently, theories contesting ontologies of geo-specific social definitions, along with 'hybrid geographies,' (Whatmore, 2002) have both promoted--and clouded--the ability to represent a community in overlapping terms of socio-politico-cultural-ecological definition. And yet it is precisely this nexus of perspectives, (Lorimer, 2005) fluidly observed and creatively depicted, avoiding pre-determined areas of meaning and with edges blurred beyond disciplinary constraints, which permits the possibility of introducing more accurately a people who are complex and various.

The aim of this research was to participate in unmediated witnessing and collaborative, observational and qualitative fieldwork with the *Caiçara* communities on the island of Ilhabela, just off the coast across from São Sebastião, and to do so at a time of rapid change. The environmental expertise of the *Caiçara* has not been widely recognised, yet this time of shifting social pressures and climate change suggests that their intimate knowledge of their local marine environment is urgently needed and of global importance. However, there is also a general awareness that this indigenous knowledge in itself is not enough to stem the flood of undesirable change, or that change can be avoided. As a case study in the conflict between traditional knowledge and forced cultural and environmental changes, this research focuses on the nexus of traditional fishing communities, the fish they live by and the effects of change. Their stories convey their own understanding of these changes, how it has altered the

pattern of their lives and what they see as their future. As a contribution to the field of Cultural Geography, the research methods included observational collaborative fieldwork, ethnographic interviews and interpretive witnessing.³ Subsequently, this provided the basis for a qualitative analysis of the material that is shared here. The author aims to promote the stories of *Caiçara* communities, advancing their experiences and observations with the intentions of raising more international awareness of their lives and knowledge.⁴

The *Caiçara* deserve to be better known than they are both in Brazil and the wider world. As a people who are friendly although reserved at first meeting, like so many others who lead traditional lifestyles, they tend to avoid large groups of people, preferring their own remote communities and quiet, patterned ways of life to the hustle of larger cities and metropolitan dwelling. Recognising that there is real diversity even within the *Caiçara* community, particularly between individuals, and mindful of Agamben's (2013) complexly constituted notion of communities, the aim in this research is to amplify their concerns, as voiced in their own words, rather than to speak for these peoples as outsiders. What follows attempts to share their experiences as accurately as possible, deploying ethnographic observation, recorded interviews, documentary photographs, videos clips and sound recordings to capture first-hand stories, about their relationship with their environment. As an additional dimension, discussions with academic colleagues from many disciplines, government offices, and traditional bibliographic searches complement this investigation.



Fig. 1 – Map of Ilhabela

Life on the edge

Thinking is neither a line drawn between subject and object nor a revolving of one around the other. Rather thinking takes place in the relationship of territory and earth... involving a gradual but thorough displacement from text to territory. (Whatmore, 2006)

Islands have a way of focusing attention on edges: as the meeting of sea and land, as the distance from island to coastal shore, and as the perimeter of island time compared to mainland time, life is lived at a different pace and rhythm. The edge of Ilhabela is more than a physical containment; it is also a readymade metaphor for life that looks out to sea, gazing at the far horizon and the waves below, often from homes and shelters perched on rocks. The liminal line of an aquatic life and one on solid ground provides a poetic structure and comparison.

To reach this island of Ilhabela -- literally 'beautiful island' in Portuguese — one arrives via a short ferry ride from São Sebastião, in São Paulo state, located on the south-of-middle coastal (technically, southeast) Brazil. One of the first things the visitor notes on the map of the island is its 41 beaches; the names of these beaches ring the island like a necklace. The main population and developed area is located on the west coast of the island, facing the mainland across the São Sebastião channel in the Atlantic. The largest city on the island is Perequê, but most of the island's western edge is a continuous line of development; from hotels to beach bars to houses to restaurants, the palm-lined accommodations for tourists and islanders alike are sited within view of the channel.

Over 85% of the island is a mountainous state park and nature reserve, consisting of densely wooded mountains and a few visible waterfalls. The forested hills are covered by dense jungle-type growth classified as Atlantic rainforest. The largest mountain peak on the island is the distinctive nipple-like profile of Beapis, with neighbouring jagged mountains forming a vertiginous horizon. In colonial times European settlers of many nations, including Germans and especially Portuguese, established plantations of sugar cane and coffee in the lowlands on the edge of the coasts. The precipitousness of the topography of the eastern coast on the Atlantic side meant that, apart from a few beautiful beaches — like Bonete (pronounced *bō-naytch* in the island's accent), and Castelhanos, the site of the oldest shipwreck off the coast—the rocky cliffs meant that the land was cleared only within relatively close and low-lying areas. Inland was not only more densely vegetated and mountainous, but also home to bands of escaped African slaves, who managed to flee from colonial plantations. Today, there is a ban on any building or construction higher than 200 metres above sea level, meaning that

all of the hills are entirely forested and bare of manmade structures. Travelling by boat around the eastern, ocean-facing side of the island, great boulders, like giant toes dipped in the sea to test the waters alternate with vertiginous cliffs, all covered with dense vegetation in a patchwork of textured greens: lime, olive, emerald and avocado. Occasional patches of smooth pea-green grasslands indicate the remnants of former plantations, a reminder of colonial days.

Ilhabela *Caiçara* communities lie mostly on this eastern, lesser-populated side of the island and live in different stages of closeness to the urban areas. At one extreme, some are very isolated, and at the other, some cater more to tourists, especially in recent years as the size of the fishing catches has been depleted. But isolation is also a state of mind, and for some *Caiçara* communities there has been a conscious decision to turn their backs on tourism, knowing that the influx of outsiders would inevitably change their way of life. Firmly contained edges are difficult to maintain, however, and there are paradoxes of isolation: in the last three years Wi-Fi signals provided by support from the Brazilian government means that adolescents, even in the most remote communities, play video games and chat via social media on their iPhones in the beach bars during the few hours of community-generated light (in many beaches, this is from approximately 8-10:30pm or so). These lights, too, are a very recent introduction; some communities have only just received the solar panels erected by the government to provide electricity in the last 18-24 months. Technology has a universal appeal, especially for the youth, and the connections between communities are in a process of rapid change with the advent of Wi-Fi and WhatsApp. As with most change, this has both beneficial and detrimental outcomes. The youth are now demonstrating to their elders how to stay in communication with other *Caiçara* communities, for example, by linking families and

villages that were formerly out of frequent communication.⁵ But the change has also brought the outside world's material trappings, expectations and economies closer to these beaches, in contrast to the much quieter rhythms of previous generations. Fewer youths see much advantage in staying at home once they are familiar with the allure of the larger metropolitan world and its comparative wealth.



Fig. 2 – The *Caiçara* circle fishing technique, with nets being raised to bring in the catch. Photo: C. Baeumler, 2018.

A way of life

The traditional lifestyle of the *Caiçara* peoples of Brazil over the past 300 years has been based on a deep knowledge of fishing. The richness of the tropical Atlantic rainforest, and the

Caiçara's coastal sea-facing communities provide the setting for a life based on fishing, supplemented by some agriculture and kitchen gardens and recently, tourism. Ilhabela *Caiçara* communities are most often located in remote villages where freshwater rivers join the sea, accessible almost entirely by boats or a trek of many hours over thickly forested mountain paths in 30+ degree heat. Other *Caiçara* communities on the coastal mainland in Ubatuba, Caraguatatuba and Paraty, and other neighbouring island communities such as those living on Búzios, Pescadores, and Vitória, resemble these coastal dwelling sites.

Focusing primarily on the *Caiçara* of Ilhabela, also known as the São Sebastião Island, the question is raised about identity and what exactly constitutes *Caiçara* status. *Caiçara* identity is a contested one; there are *Caiçara* who live on the coastal mainland along a stretch of Brazil from Rio de Janeiro to the southern coast of São Paulo state. In fact, those who self-identify as *Caiçara* often extend much farther north and south. When interviewed closely about what constituted *Caiçara* status, those who identified as *Caiçara* in many interviews said that 'living by the sea,' or 'people who fished' constituted their identity. No one identified precise geo-locational identity between fixed points on the Brazilian coastline, nor racial mixes, nor post-colonial history as an aspect influencing their *Caiçara* status. On Ilhabela, seven separate communities and every beach around the circumference of the island were visited for this research project⁶, and many individuals were interviewed across the island. Additional information was sourced from various references, including site visits and direct observation of fishing practices in boats alongside fishermen. In addition, ethnographic interviews were conducted with people across the island, site visits were undertaken with a fish breeding and genetic research NGO and correspondence was exchanged with other NGOs and researchers. Academic papers published in this interdisciplinary area of sited

research were consulted, discussions held with ethno-biologists, metadata sought on *Caiçara* communities, as well as publications from various governmental agencies' citing statistics and statutes, all of which have been referenced in substantiating this work.

The parameters of this research project were to examine the lived conditions on Ilhabela, observe the community and especially the *Caiçara* traditions within their smaller communities, with a particular interest in their interactions with the fish, birds, animals, flora, aquaculture and agriculture, and habitat of the island generally, with the intention to witness and document the concerns of the *Caiçara* in relation to their long-established artisanal, sustainable life adapted to this particular ecosystem. In doing this, the author wishes to draw attention to the challenges faced by the *Caiçara* in negotiating the effects of climate change, pollution, over-fishing, and repressive political regulation, in the context of changing technologies, economic pressures, population and increasingly limited resources.⁷

As with many other contemporary Brazilians, the *Caiçara* are a people who may be described as descendants from a combination of indigenous Amerindians (Tupis)—who the native peoples in the centre and eastern coast of Brazil—with an additional mix of African Brazilians and European colonial settlers (Garmony and Pereira, 2019). As such, they have practiced their traditional lifestyles over the last three hundred years and very proudly self-identify as artisanal fishers. Traditions and family are shared between these isolated fishing communities, and often people from different *Caiçara* settlements intermarry. Families tend to be quite large and children manifest a diverse, genetically blended and intermixed inheritance; siblings often have various combinations of blue eyes and brown, straight hair

and curly, fair and dark complexions. Close family bonds are the norm, even across widely extended families with varying characteristics. *Creolization* in social examples has inspired an entire theoretical movement of complexly blended multivalent paradigms of cultural analysis.⁸ Its application is useful in this project insofar as creolization theory embraces ‘the development of a reciprocal, relational and intersectional critical approach attentive to the legacies of colonialism’ (Linnet and Shih, 2011). In a similar vein, Whatmore’s (2006, 606-607) identification points to the need for more inclusive methodologies, and the theoretical platforms that support them (such as creolization). Beyond the ‘geo-’ and the ‘bio’ divide typified in the diverse work of the cultural geographers previously cited, combined here are *Caiçara* themselves, whose daily fishing and family lives are directly challenged by the context of climate change, pollution and declining catches, in patterns that are interwoven with environmental policy.

The political presence of the *Caiçara* is somewhat confusing from an outside perspective, and occasionally disputed within communities, with official leaders selected by virtue of their personalities and perceived competence. Spokespersons for large areas seem to emerge by consensus based on status within the community. Longstanding difficulties associated with *Caiçaras* organising effectively have been slightly addressed in more recent years by mobile technology and by the work of the Forum of Traditional Communities (FCT), for example. But the lack of clear representation and leadership has stood in the path of *Caiçara* political effectiveness, and has ultimately appeared as fragmentation, rendering them more vulnerable to the opposition of strong political opponents (Le Sann, 1988).



Fig. 3 – A daily catch on Ilhabela: the larger fish in the foreground are called *Bonito* (‘beautiful’), and belong to the tuna family, and the smaller golden fish called *Pampo*, also known as Palm and Pork fish in Portuguese. Photo: M.Modeen, 2018.

Artisanal fishing

*When I teach my son to fish, he will never need to buy a fish in the market.*⁹

The Brazilian coastal and island areas contain one of the most diverse ecosystems (in terms of numbers of fish species) in the world (Amigo, 2018).¹⁰ Remarkably, 98% of Brazil’s fishers are registered as independent or small-scale operators,¹¹ with almost all of the *Caiçara* falling into this category.

Fishing, especially on the coastal sea, is usually performed in paddled or motorized canoes, and the gear used varies per locality. For example, at Búzios Island and at the

Grande bay area, hook and line (including ripper jig) and set gillnets predominate; at Sepetiba bay, encircling nets for shrimp and fish are the gear used. Fish traps are also employed, such as the two different *cercos* (fish traps) used on the southern Brazilian coast. The first, brought by the Japanese migrants in the Thirties (Japanese *kaku-ami*), is made of chambers of nets...(Begossi, 2006)

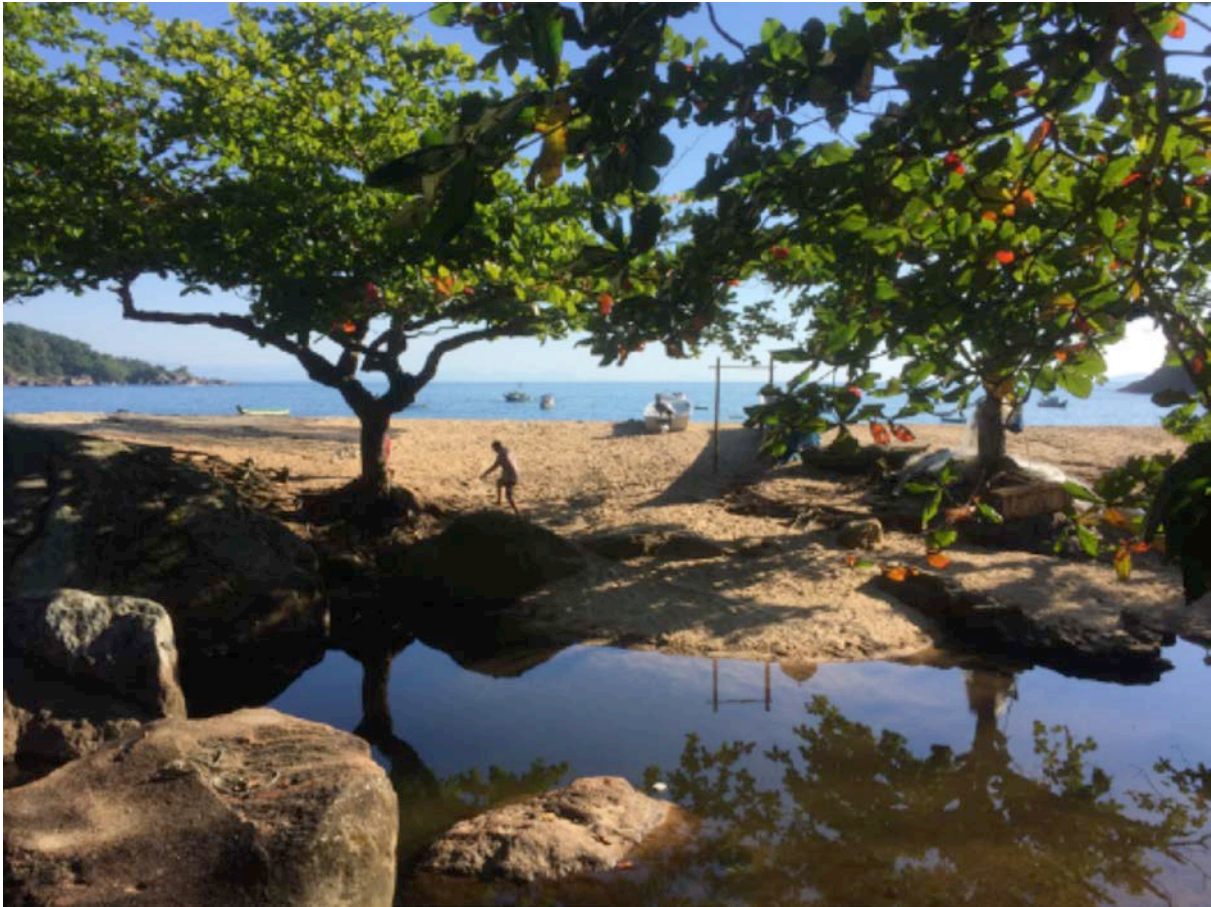


Fig. 4 – A photograph of the *Caiçara* fishing life, here showing the Atlantic-facing *Praia de Serraria* (Serraria beach) with boats in the distance, as viewed from the village, which is situated behind trees on a freshwater river. Photo: C. Baeumler, 2018.

The *Caiçara* fishing circle is a prime example of artisanal fishing. For 15 days a month with the nets open and in use, the open ‘portal’ under the water level allows fish to enter; they swim into the generously broad enclosure, but are unable to find their way back out again.

Twice a day, at dawn and sunset, the *Caiçara* take two or three boats out to selectively empty the nets, carefully releasing sea turtles, as well as inedible, prohibited and immature fish, keeping only fish that are valued and sustainable. They place the catch directly in the boats, restore the circle nets with wooden edge-floats (clearly visible in Figure 2), and head for shore to put the fish instantly on ice.¹² Some fish are kept for the fisherman's families and the vulnerable members of their community who rely upon them: widows, the aged, and disabled neighbours. The remaining catch is taken to fish markets in the larger towns, mostly on the opposite side of the island and a good hour and a half to two hours away by motorboat. Catching, cleaning and taking fish to market, as well as repairing boats and nets, make for a very long and tiring day's work. For 15 days a month the circle nets are 'offline' (not used), and are taken out, dried and mended. This conserves the fish stock and preserves resources, as well as allowing time to restore the nets. A significant part of these fishermen's pride in being 'artisanal' is their intimate knowledge of fish stocks, including the breeding periods for each species, the effects of the lunar cycle, and so on. Watching the pod of dolphins leap and dive, they know that the squid is in season¹³. Fish are ubiquitous in the life of the *Caiçara*: they are food, medicine, income, and ensure wellbeing. By extension, they have come to represent the communities of people themselves. For a people who have very little, fish are everything. The representation of fish in art, documentary photographs and films, has also overlaid the aquaculture with human fisher workers (Begossi and Caires, 2015).

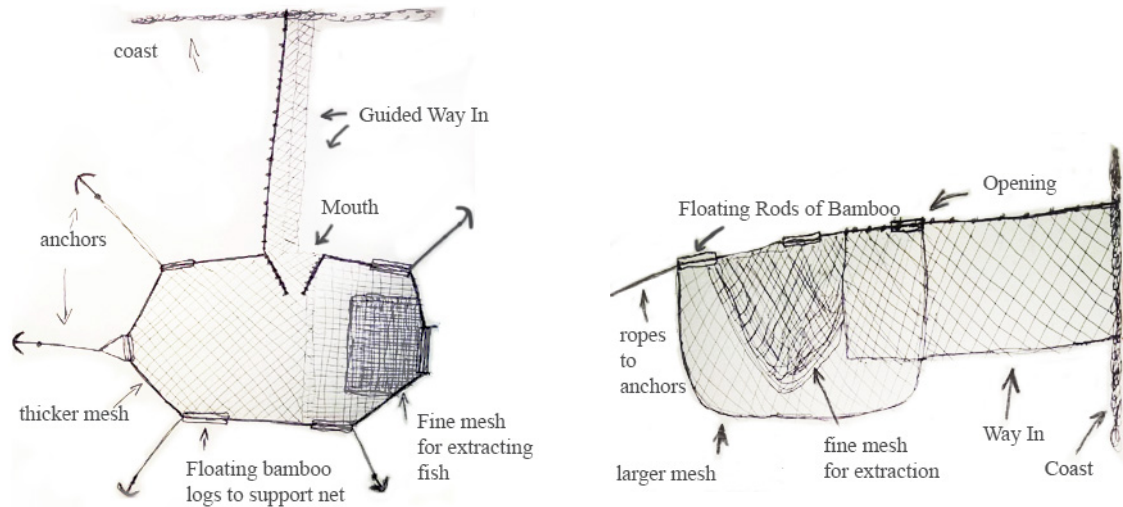


Fig. 5a. and 5b. – Drawn illustration of the circle net technique, from a top view (left) and side view (right). By Laelció Pereria Da Silva, 2019.

This illustration above (Figs 5a and 5b) shows how the fish are conducted into the fixed floating circle net by means of a fixed net leader. They enter the circle through open flaps but then cannot easily find their way out again. When the nets are raised gradually from the end with wider mesh (in Fig 5a, the left side of the net), there is an opportunity to select which of the live fish to keep and which to release back alive.



Fig. 6 – Nets drying on *Praia Vermelha*. Photo: M.Modeen, 2018

Traditionally, fishing was an occupation for men and boys with very few women participating. Given heavily gendered social norms, those women who do fish must also maintain their houses, cook for their families, tend any gardens and animals and conduct all of the other daily activities done by women, effectively taking on a double workload. However, the full extent of women's contribution to fishing is vastly overlooked ¹⁴ (Probyn, 2016). Women participate in sorting, cleaning, net-mending, preserving, and cooking the fish. At every level, through their often unrecognised work and contribution to the fishing economy, women are knowledgeable about the types and scale of fish catches.¹⁵

The deep local and generational knowledge of *pescadores* means that they not only have an intimate knowledge of the values of fish as food, but of other uses for fish as well. An understanding of the medicinal qualities of fish as medicine is a part of their culture: sea chubs, silver porgy, bluefish, and types of grouper all serve medicinal purposes (Ramires, Rotundo, and Begossi, 2012). For severe burns on the skin, an application of the skin of the *espada*, the largehead hairtail, also known as ‘belt fish’ (*Trichiurus Lepturus*: see Fig. 7) has proven effective in eliminating the need for some skin grafts and promoting healing (Ramires, et al, 2012).

Taboos around certain fish are also the result of a long-acquired knowledge (Ramires, et al, 2012, 24). Some fish are forbidden for predictable reasons: the puffer fish (*tetraodontidae*), for example, are avoided because they are poisonous and stonefish (*synanceia*) due to their venomous spines. Beyond taboos, other reasons determine the avoidance of certain fish: pregnant women are advised to avoid some types, and there are clear taste preferences as documented within certain sited communities. All evidence avoidance of the malodorous ray (*Rajidae*), for example, or the moray (*Gymnothorax*, in which genus there are more than 128 species). (Ramires, et al, 2012, 24).

The dual process of conservation and economic development has increasingly squeezed the rural populations. At one side, the regional development model, based on large-scale single crops (such as banana plantations) and tourism, leads to land conflicts; at the other side, the establishment of conservation units turns local residents into invaders of their own land. In this complex situation, the government, local residents, and large farmers contest their rights to land and to nature (as quoted in De Castro, Sigueria, Brondizio, et al, 2006).

In this observation by De Castro and co-authors, the irony of contested rights pits a government against its own peoples, and against its traditional peoples more than many other sub-groups. This is because the traditional techniques of the *Caiçara*, for example, are based on the use of traditional materials people have been prohibited from using within conservation units. These include the wood for their boats (see below) and even the bamboo they cut to create fences to protect their gardens. This well-intended, but in practice, repressive legislation certainly makes them ‘invaders of their own land’. This is, of course, just one position. A government official might make the case for ecological conservation: the number of trees felled makes no difference; each tree represents a diminishment and a loss of conserved resources. This alternative perspective points to the contestation between the government’s position and that which emerges from the lived experience. But far more is at stake than a simple binary opposition. This example shows that the legislation lacks subtlety in making no distinction between small and large-scale use of materials, or of the value of tradition in terms of resilience, of the need for sustaining a tradition in material culture, or even of the self-reliance that one tree might constitute in a family’s marginal existence in a rural environment. What is perhaps lost in such blanket regulation is the sense of valuing traditional knowledge as a living cultural heritage, forms of valuable practical expertise that might be akin to a national ‘treasure’ (echoing here the Japanese notion of *Ningen Kokuho*, a national living treasure). And from the perspective of the *Caiçara*, there is the suspicion not only of being devalued, but also of the government’s desire to see their ways of life erased completely, a sense that their independence and self-sufficiency are perceived as threatening by the state.

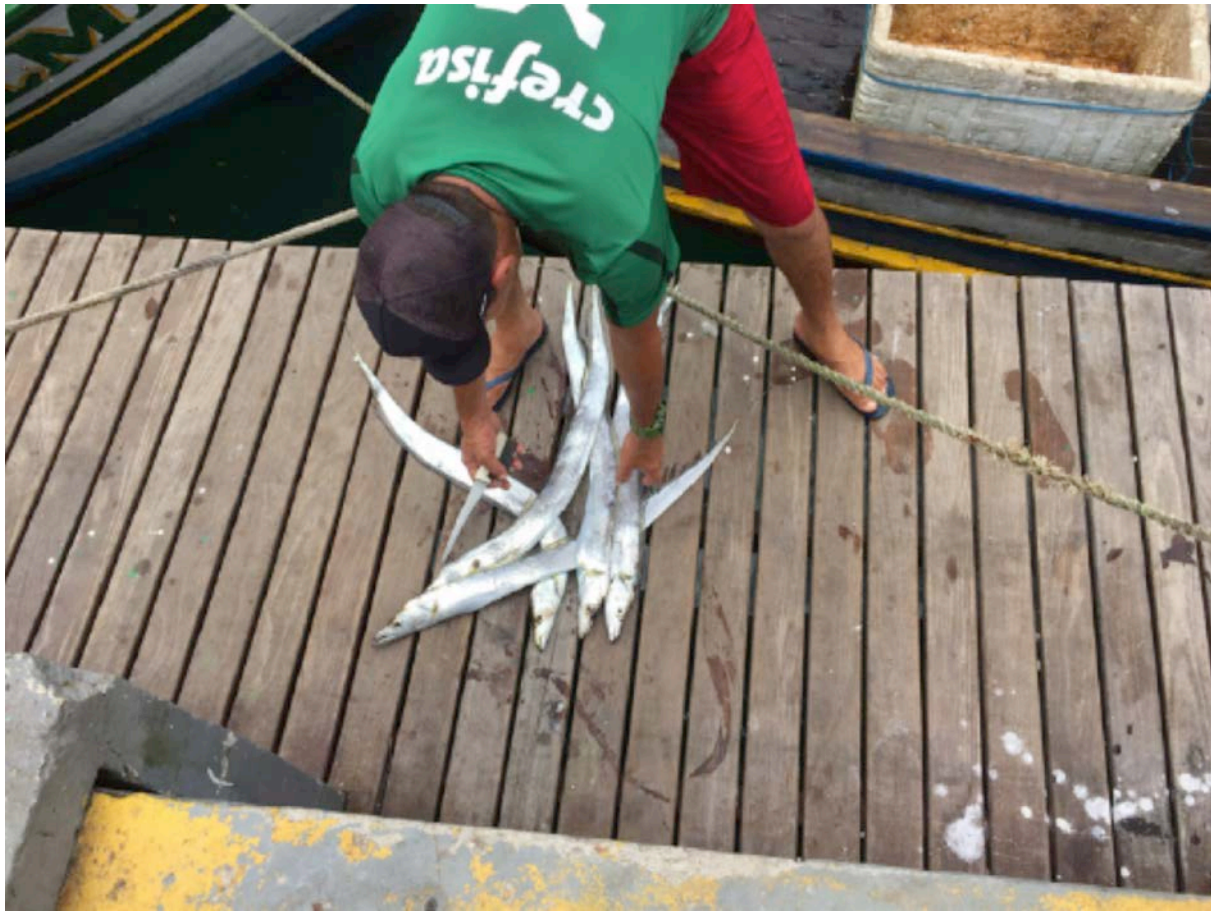


Fig 7 – *Espada* fish on the dock, about to be fileted by a *Caiçara* fisherman. Photo: M. Modeen, 2018.

Setting aside for a moment the conflicting positions on environmental legislation, let us focus on fish in the environment. The beautiful silver *espada* in Figure 7 are not only used in healing, but are among some of the favoured types of food on the island. The fillets have a delicate flavour and are usually plentiful. Figure 8 shows a pier and dwelling in a remote area by the side of a recently established scallop farm. The marine culture here is based on the regeneration of a type of scallop that has nearly disappeared in recent decades, the large scallop (*Pecten maximus*).

Nearby Ilhabela is the archipelago of Alcatrazes. Globally, this group of islands ranks near to the top in terms of the diversity and plenitude of fish.¹⁶ With the exception of one island, used by the Brazilian Navy for artillery practice, it is protected as part of the Alcatrazes Marine National Preserve, the second largest in Brazil next to the Abrolhos Marine National Park.



Fig. 8 – A family dwelling with house and pier, near the scallop farm initiated by Ilhabela resident, Daniel Carvalho Rodrigues. Photo: M.Modeen, 2018.

Despite the prevalence of fishing, meat is still the main source of protein in Brazilians' diet (Begossi, Salivonchyk, and Hallwass, 2017). But in the thirty years between 1980 and 2010, the consumption of fish in Brazil has more than doubled while its population has not

(Begossi, et al., 2017, Table 2.) Importantly, researchers like Begossi and her fellow scientists Gustavo Hallwass and Renato Silvano, among others, have been gathering statistical data about diets and fish harvests over many years to watch the correlations (or otherwise) between the scale of catches, fish species, habitat changes and other environmental influences on diet and fish population. This scientific documentation and the emerging records from phenology centres, otherwise known as Citizen Science,¹⁷ are helping to aid the collection of metadata that documents fluctuations in water temperatures, weather, and the effects of climate change.

Sorrows of a changing lifestyle

Returning to the partial focus of this discussion partially on edges and borders, the edges of the island and the boundaries of communities means that attention must be paid to the continual redrawing of these edges. In this sense, the traditional fishers' lifestyle described above must be represented with lines erased, redrawn, and erased again, as change demands. One fisherman said that he could only fish now for two months of the year, and that the levels of catch were so low that he could not make a sustainable living. He lamented that 'it was good that his father was no longer alive to see such a thing.'¹⁸

One visible change is the government's outlawing of the tree felling needed to create the hand-carved traditional *Canoa Caiçara*. The trees most preferred were traditionally cedar, followed by Timbula, Ingá, Bracui, the Loro, Guapuruvu and especially, Angelim Amargoso, Angelim Gisara and Angelim Pedra (also known as Angelim Vermelho for its reddish colour). These latter three, longwearing hardwoods naturally resistant to rot and fungi, were very good for making canoes, and were traditionally harvested during a waning moon in the

lunar cycle. There are no more original stands of these trees on the island; since the colonial planting of sugar cane and coffee, only secondary stands of these trees exist outside of the protected State Park. The *Caiçara* are also prohibited from taking fallen trees for the purpose of canoe making.



Fig. 9– Brightly painted *Caiçara* canoes, shown here on the beach of Villa, Ilhabela, are now now considered a patrimony or legacy to sons or grandsons. Photo: M.Modeen, 2019.

Along with a disappearing supply of trees for traditional handwrought canoes, there is also a fully documented diminution of marine species, with an estimated overall 60% reduction of fish species. Marine fish capture as recorded in official Brazilian statistics reached a

maximum in the year 2009, with a record 586 tonnes of fish caught and has been dropping since then.¹⁹ The *Caiçara* speak about this with pain in their eyes; they say they see more anchovy, *sororoca* (gold-spotted Atlantic Spanish mackerel: *scomberomerus brasiliensis*) and jellyfish, but far less of the other species that were caught previously.

Pollution issues

Pollution has been another factor in the reduction of fish catches. It is estimated that spills from crude oil tankers between 1994 and 2000 accounted for 1,000 tonnes of crude oil released in the Sao Sebastião Channel during that period.²⁰ Following a separate incident, a \$5m Br fine was levied for the 2000 spill against Petrobras, Brazil's nationalised oil refinery, for the 2000 spill. Another article suggests that the 1994 spill consisted of 2,700 tonnes of crude oil, a far greater amount than had been originally estimated. Twenty years on, scientists have compiled and studied the annual metric indications for hydrocarbons that prove the lingering, harmful presence of petroleum residues (Zanardi-Lamardo, Bicego, and Weber, 2013, 203).²¹ The winds whip the oil on the surface of the water into a foam, and then over time into a more and more densely compacted substance, until it achieves a kind of tar-like, asphalt-sticky consistency. Fishermen find this substance between rocks and sticking to the sides of stones on the shores, while the oil company denies that spills have occurred.

Experienced fishermen from *Praia de Serraria* who were interviewed cite an oil spill from approximately Sept-Oct 2018 and describe meetings with oil company representatives who deny any spills in the first instance, or who blame others and take no responsibility, offering no recompense for dead fish and a complete absence of shrimp.



Fig. 10 – Composite images of oil spill residues that have congealed into a sticky mass, killing fish and marine life. Photos by M. Modeen and Francisco Da Silva, 2018.

Untreated wastewater generated by the island's population is another polluting factor. Sewage pipes carry raw sewage from the year-round population of about 32,000 people (which swells to over 100,000 in the holidays, especially with stopovers by large cruise ships) directly into the Channel. This pollution is visible in the rivers and streams that flow into the sea. It has just been announced by the Municipal offices (June 2019) that the effects of the sewage are deleterious to health, so instead the sewage pipes will be extended a further 6 kilometres out into the water. Lack of water treatment and proper sanitation is one of the biggest areas for concern in the remote *Caiçara* communities since there, too, untreated waste is channelled into the rivers.

Waves of dead nauplii shrimp were visible in the waters off several eastern beaches were in late November 2018; two accounts by groups of local fishermen attributed this phenomenon to different causes. According to some of the fishermen interviewed, this extermination of juvenile shrimp was due to quick shifts of water temperature and the effects of a change of weather, from cooler to almost instantly warmer days at the end of November 2018. Others attributed the dead immature shrimp to the recently witnessed oil containment ring off the São Sebastião pipeline and its contained spill, where oil tankers empty their vessels into the pipeline, just opposite Perequê in the channel.



Fig. 11 – The inflatable oil containment ring off the São Sebastião pipeline can be seen in the centre of this photo, floating in in the Channel. Photo by Laelcio Da Silva, Dec. 2018.

And finally, further threats to marine life arise from so-called ‘factory fishing’. For example, sea turtles are preserved in the *Caiçara*’s sustainable artisanal fishing practices, but die in great numbers when caught in the dredge nets of industrial fishing boats. According to Brazilian government statistics, five species of sea turtle inhabit this coastline and all five are endangered species.²² In an effort to protect these creatures, an organisation called TAMAR (the Brazilian Sea Turtle Conservation Programme) is dedicated to their conservation.

Permeability, introduction and displacement

Given the research decision to frame the island from the perspective of its edges it would be a mistake to be misled by this model into thinking of Ilhabela as closed within, or limited by, its own perimeters. There is a permeability to the imagined construction of place that cannot be overlooked. For example, in a cartographic sense, the island is permeable in many ways, including the flux of its tides, and the erosion of its shores.

The term of ‘traditional’ as it is applied to communities, as opposed to non-traditional, or urban or touristic, is also permeable. For example, De Castro, *et al.* (2006) point out a challenge to these constructs:

‘...the bias toward “tradition” and “collective property regimes” threatens the entire range of local communities along what might be called a traditional-non-traditional populations gradient.’

One might infer from De Castro *et al* that a misappropriation of traditional commons, for example, opens up the contradiction when property developers and real estate speculation is

offered as a lure to tourists in the use of a language of ‘traditional values’ to sell property to tourists in a way that undermines the identity and livelihoods of local communities.

There are at the time of writing an estimated 214,450,000 people in Brazil. As a nation with a vast landmass, it is one of the lesser densely populated nations in the world (151st out of 193 countries), or approximately 25.18 persons/km².²³ The Brazilian government recognises both the wealth of this natural resource, and the global attention that any changes to environmental policy inevitably brings. In the mid 1980s, Pallemmaerts asserted: ‘...Brazil’s military rulers and economic elite view the Amazon forest as a vast “unoccupied” and “unproductive” frontier area which is to be “developed” and “integrated” into the national economy.’ (1986, 374.) This ‘frontier’ and ‘potential to be exploited’ would also include the Brazilian coasts and aquaculture. Garmony and Pereira (2019, 145) echo this observation with their general premise that Brazil’s environmental riches are central to its historical identity as ‘an almost inexhaustible’ source of the world’s raw materials, and—even if only in imagination given the current evidence of human degradation of this environment—this partially explains the paradox of great biodiversity sitting alongside great destruction. The assumed right to exploit natural resources has, if anything, grown stronger in the halls of a government led by the new President of Brazil, Jair Bolsonaro since he took office in January 2019. It is an ominous start from the perspective of the *Caiçara*: President Bolsonaro has legalised ‘taking responsibility for indigenous land demarcation from FUNAI, the Indian affairs department, and giving it to the Agriculture Ministry ...virtually a declaration of open warfare against Brazil’s tribal people.’²⁴

Government policies and actions, and fish wars

According to the *Caiçara*, policy making by governmental agencies, however well-intended, is executed by those who seemingly know very little about the actual practices of traditional fishing, who do not consult, and therefore do not understand that the *Caiçara* engage in sustainable small-scale fishing. Most of the fishermen interviewed asserted that their own government creates their greatest problems, with policies that specifically target and prohibit their lifestyle. They are not allowed to harpoon fish, spear fish, or use straight-line nets (a technique sometimes called ‘fence’ nets, used for over a hundred years). As already cited, they cannot cut trees to make their canoes, or salvage fallen trees, or even cut a single bamboo stem to make a fishing pole. The cutting of bamboo was also typical in former times to generate the materials needed to fence off their domestic gardens that encircled the *Caiçara*’s traditional homes. They must have licenses to use a chainsaw, and since there are no large trees that they may permissibly cut the possibility of creating ‘officially’ permitted *Caiçara Canoa* has come to an end, which doubly disadvantages poor fish workers by removing the very means by which to fish and move about. Living in remote communities, they told the most harrowing stories of the death of loved ones from lack of access to hospitals through not having a boat.

The Brazilian government’s Ministry of the Environment has several arms: some of the information cited here comes from the Secretariat of Extraction, the Office of Rural Sustainable Development, the Forrest Foundation, and its subset, the office of the Marine Environmental Protection of the North Coast.

The *Caiçara* allege that the government benefits directly from industrial-scale fishing industry, gesturing with their hands to indicate bribery. While any attempt to substantiate this falls outside the remit of this article, the regulations the fishermen describe suggest a striking

lack of parity: the *Caiçara* say that they must fish 500 metres from shore, in international waters, but industrial fishers can fish up to 20 metres from shore, in Brazilian waters.²⁵ The *Caiçara* typically catch no more than 100 kgs, having only sufficient space in the canoes to transport this scale of catch back home, while industrial ships can haul 200 tonnes of fish — and these are of all sizes, including immature fish of all species, which diminishes future generations. Their nets do not discriminate in terms of species, which means that they are killing protected species and all manner of sea life, even if they are thrown back dead into the sea.

By contrast, the *Caiçara* usually deploy carefully devised traditional techniques, and pride themselves as ‘artisanal fishermen’, meaning that from their childhoods they learn the ways of the sea and crafts of fishing. Some of these men are also divers, observing coral and seaweed, underwater boulders near shore, the seabed and bottom feeders. In most of the small *Caiçara* communities there is a freshwater source as well; on Ilhabela these are rivers that flow from the mountains down to the sea, just past the beach houses. These fresh water sources as well are also threatened by any upset to the fragile balance of the ecosystem; small fish and river waterfowl are dependent on reasonably clean water, but as cited above, often sanitation is often a problem, given lack of proper sewage treatment. As tourist numbers swell the beach communities for day trips in high summer, the freshwater quality drops, often disastrously (Filho and De Freitas, 2018, 23).



Fig.12 – *Caiçara* youth spend most of their days on or in the water. Canoes, motorboats, skiffs or shrimp boats are all central to their work and leisure activities; as adults these same skills are essential to the community's survival. Photo: M. Modeen, 2018.

The *Caiçara* and hope for the future

The *Caiçara* language is Portuguese, a legacy of its colonial past, but more than one person interviewed pointed out that 100,000 words, especially nouns, have come from Amerindian Tupi origins. The name '*Caiçara*' itself comes from the Tupi word '*ka Aysa*' or '*ka aysara*', a reference to the bamboo fence that still surrounds many of their settlements.²⁶ As has happened with so many indigenous and traditional peoples around the world, there has been increasing pressure to drop these distinctive indigenous words and adopt a global term for

species that have more common labels (Amigo, 2018). But as any etymologist knows, indigenous words are rich in experiential knowledge and associations. To lose a linguistic heritage is to cut short the longevity of ancestral knowledge and its related phenomenological observations.



Fig. 13 – Sun on the water, ubiquitous boats and distant islands constitute the daily landscape of the *Caiçaras*. Photo: M. Modeen, 2018.

As fishing becomes less productive and more competitive, some *Caiçara* are turning toward tourism, building beach bars and initiating estate sales as increasingly frequent alternative

careers for discouraged fishermen who are tired of small catches, overly regulated restrictions and a fading future for their children. While this paper is being written, there has been more attention to collective action by local *Caiçara*, in the belief that ‘it is possible for individuals to act collectively to manage shared natural resources on a sustainable basis’ (Poteet, Janssen and Ostrom, 2010, 215). ‘There is no environmental protection if there is not a socio-environmental approach,’ Juninho Caiçaras says. Communities are more than a happenstance mixture of individuals; they are a group of people who constitute a living ensemble of human and non-human beings involved in overlapping activities of socio-politico-cultural-ecological actions. ‘Traditional communities, with their ancestral practices, are a guarantee of environmental conservation’ (2018).²⁷



Fig. 14 – Bonete, a *Caiçara* village viewed from above, showing the typical beach setting and fresh water river flowing into the sea. Photo: Francisco Da Silva, 2018.

Elinor Ostrom, who won the Nobel prize (2009) for her work on the economics and politics of the commons, has provided the groundwork for a theoretical approach underpinning viable conservation of environmental resources, and in particular, positioning the means to recognise the value of communities like the *Caiçaras* (1990). The contribution her work makes to an interdisciplinary approach to the global appreciation of traditional life patterns is inestimable. Essentially, Ostrom argues that if conservation of natural resources ‘in the commons’, such as water or grazing lands, is not managed as a whole resource by the group using it, then all would suffer its demise. To avoid tragedy, ‘the tragedy of the commons,’ (Hardin, 1968) the

real life practice of the commons substantiates that groups are fully capable of self-regulating use of resources for an ethics of ecology and survival of the group.

The Brazilian government's official position concurs with the need for sharing, even if it comes to a different solution for the means of this protection of rights. The role of the state covers the need for conservation of environmental resources and therefore states that it must act as an effective manager of such property in favor of social interests, as stated in Article 225 of the Federal Constitution.²⁸ Where Ostrom's vision and the Brazilian government's actions differ greatly is the detailed means by which this 'defense and preservation' is achieved.

In order to provide the information necessary to determine the needs of the commons — technically under the guardianship of the Brazilian State Constitution as the continental shelf and 'exclusive economic zone' (De Melo and Toguerio, 2012, 16) — it is necessary for the Brazilian government to use its regulatory powers and limit access to fishing with a system of licenses. It may be argued that this power to limit access to fishing is misguided in its application to *Caiçara* and not restrictive enough for drift net fishing as used by so-called factory ships. However, accurately and broadly scoping information upon which to decide regulatory actions is paramount. According to Poteete, Janssen, and Ostrom,

Unfortunately, there are still considerable 'battles' among scholars who rely on different methods or assumptions. Some scholars engaged in in-depth descriptions of cases challenge the usefulness of efforts to seek general patterns, while some who do large-N observational research do not recognize the value of case studies or experiments in untangling causal process. Likewise, scholars from different

disciplines or theoretical perspectives often hold different assumptions about how the world works, or disagree about priorities, both in research and in policy (2010, 266.)²⁹

The inability of researchers to surmount disciplinary barriers is also reiterated by many other academics, who see the frustrations of divisive and often narrowly argued theories missing the larger overview, thereby reducing the effects of the social research and its impact to very little.³⁰ Adams writes:

... these communities are usually analysed in literature through an ecological romantic view, linking them to the “good savage” myth. It is also proposed that the lack of multidisciplinary studies reduces the cultural richness of these [*Caiçara*] communities (Adams, 2000, 145-182).

The ‘commons’ of Ostrom’s work is based on the meaning of ‘sharing’, not on ‘what is of little value’, which is another use of the word. The true value is in coming together, in looking at problems across a variety of points of view and finding solutions through this dedication to the value of multiplicity, and with differing skills. Scientists, geographers, artists, philosophers, politicians and economists, among many are needed to work together. So too, Smith and Howe posit that climate change can be understood as social drama teased out in different cultural narratives. They ‘turn to the surface, visible, public realm of deliberative rhetoric and agonistic ritual’ to suggest that ‘climate change exists in a complex field of stories’ (2015, 16). The stories of the *Caiçara*, then, are the ground zero of these revelations, the documented observations of environmental damage and the voices of lived experience and intergenerational knowledge. Hope for the future lies precisely in overcoming narrow perspectives, political divides, and disciplinary barriers, seeking the means and methods to — in the words of Ostrom — ‘work together’. For the

survival of threatened resources and of the communities most reliant upon them, collaboration in research, policy and action are compulsory.

A new praxis: cultural legacy, *communitas*, and deep mapping

Among ethnic minority populations of traditional and indigenous communities across the world many indigenes have been recognised as stewards of the environment and experts of local knowledge. First Nation Canadians, Native Americans, Māori and a great many other tribal nations and traditional peoples are directly involved in the protection of their environments, acting as conservationists and wardens, aided by the legacy of their traditional knowledge.³¹ According to National Geographic, while they constitute ‘less than 5% of the world's population, indigenous people protect 80% of global biodiversity.’³² As a vision for the future, and especially looking forward to the future for the *Caiçara*, the deployment of artisanal fishermen with their intimate knowledge of fish habitats and breeding cycles, in the service of marine protection and promotion of the conservation of bio-diverse stocks seems more than sensible.

Additionally, the importance of community actions and grassroots movements, both as they are self-organised on a local scale and at the level of national and international non-governmental organisations, is clear, as they promise to dissolve fixed perimeters of engagement and ensure the overlapping of joint ecological concerns. The Projeto Garoupa ao Mar on Ilhabela, for example, is a project funded by private donors and crowdfunding, which makes it possible both to study groupers, and to reproduce large numbers of fingerling groupers that are placed back into the waters surrounding the island. The grouper is a

hermaphroditic species, and at small early maturing stages, the fish are female. But as they grow to mature years, many individuals develop from females into males, a transition triggered by changes in water temperatures and hormonal releases. As the largest of the species, these males are the most coveted, and despite the grouper's place on the protected species list, more males are taken than is sustainable for healthy reproduction of the fish population. The NGO study centre helps to learn more about separate types of sexual maturation of these groupers, and other genetic research, and replenishes stock in wild waters.³³



Fig.15 – Castelhanos Beach, seen from the hills above. Photo: Fran Pereria Da Silva, 2018

The *Caiçara* themselves understand that they have suffered from a general lack of representation due to limitations in financial means and poor education. They realise there is an urgent need to communicate across communities up and down the *Caiçara* beaches, to work together to preserve their traditional ways of life as much as possible, monitoring fish populations and the state of all marine life. In this last task, they would like to represent themselves as the stewards they believe they are, and want this role to be designated through negotiated discussions with the relevant Brazilian government agencies. As Jentoft and Chuengpagdee argue,

The governance of small-scale fisheries must be founded on transdisciplinary perspectives in order to effectively address the multiple concerns associated with wellbeing, viability and sustainability of small-scale fisheries and fisheries communities, which are the basic conditions for their ability to fulfil their potentials and contributions to society (2018).³⁴

If the most knowledgeable and capable members of the fishing community, in this case the *Caiçara*, can serve as experts for conservationist groups, ecologists and guides for eco-tourism and education, aided in their task by the publication and dissemination of steps to be taken to preserve their fragile and bio-diverse environment, then they themselves feel they might have a chance to make a lasting difference in preserving their island, coastline, bio-diverse fish stock and waters for the future.



Fig.16, – Francisco Pereira Da Silva (left), eco-guide and professional diver, and his brother, Laelcio Pereira Da Silva (right), fisherman, wearing handmade woven reed hats. Photo: M. Modeen, 2018.

NGOs:

NGO's supporting the *Caiçara* and traditional peoples' rights, ecological and environmental action, and conservation:

Projeto Garoupas ao Mar; Rare.org; *Forum de Comunidades Tradicionais Indígenas, Quilombolas e Caiçaras* with centres in Angora, Paraty, and Ubatuba; Fundo Brasil; Traditional Caiçaras Communities (CNCTC); National Commission for the Sustainable Development of Traditional Peoples and Communities (CNPCT); Survival International, Oceana.org

Geo-locator: Brazil, São Paulo state, Ilhabela

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Notes:

¹ Paasi, A., 1991. ‘Deconstructing Regions: Notes on the Scales of Spatial Life’. *Environment and Planning A*, 23. 239-256.

² Casati, R., Smith, B. and Varzi, A. ‘Ontological Tools for Geographic Representation’ In Guarino, N. (ed.), 1998. *Formal Ontology in Information Systems*, Amsterdam: IOS Press. 77–85. Also, *Ontological Tools for Geographic Representation*, pdf. Available from: https://www.researchgate.net/publication/36734929_Ontological_Tools_for_Geographic_Representation. [Accessed 02 Feb 2019].

³ The following *Caiçara* communities were visited by the author, colleagues and guides over 14 months and three separate rounds of fieldwork: Siriuba, Jabaquara, Praia da Fome, Serraria, Estácio, Praia do Gato, Castelhanos, Vermelha, Figueira, Bonete, and Praia Grande. Excursions were made by boat into the mangroves of Ilhabela, and across the channel to São Sebastião, Caraguatatuba and up into the mangroves there.

⁴ This is done in the spirit of ‘de-colonialising’ research, as advocated by Linda Tuhiwai Smith—as a researcher who does not wish to over-inscribe the thoughts of the *Caiçara*, but to share their concerns with a wider audience than many of them have been able to address themselves.

⁵ In one village the author visited, a *Caiçara* woman had relatives in another village that was only a two-hour walk away, but was a place that she said she had never visited in all her life. She recounted a recent *Caiçara Canoa* competition in Perequê Nov. 2018), which she cited as the very first time she had ever been to the opposite side of the island in all her life.

⁶ 18 video recorded interviews, 15 sound recorded interviews, and hundreds of photographs documented this work. It must be noted that women were often reluctant to be sound or video recorded, but freely shared conversation with notes taken. And a children’s project at

Castelhanos was held (Jan. 2020) with observational drawings, facilitating many discussions about what the *Caiçara* children noticed in their environment.

⁷ In addition to this journal article, the author is an artist who has proposed several exhibitions and is leading a collaborative documentary film.

⁸ See Dominique Chancé in *The Creolization of Theory* (Linnet and Shih, eds, 2011)

⁹ Francisco Pereria Da Silva, in conversation with the author, Dec. 2018.

¹⁰ Amigo, I., 2018. For the Caiçaras environmental laws in Brazil at odds with tradition [online], 25 April 2018, Mongabay Series. Available from: <http://www.news.mongabay.com>. [Accessed 10 December 2018].

¹¹ Rare.org, Available from: <https://www.rare.org> [Accessed 10 December 2018].

¹² Ice is another problem for the *Caiçara*; they have only one place on the island to buy it, and it is expensive. Across the channel in São Sebastião, there is also one other place, but for these fishermen, the difficulty of obtaining the ice and its cost are additional factors that are burdensome. Although they have applied to the local government of Ilhabela to establish more ice distribution centers, there has been no successful result.

¹³ Out in the boats among the leaping dolphins, the author and Caiçara watched the squid fishermen at work in Jan. 2020.

¹⁴ ‘Gender relations permeate fisheries at every level.’ Barabara Neis, as quoted in Probyn, 2016, 23.

¹⁵ Speaking about Canadian women whose families were in the fishing business at the time of the cod fishing moratorium, Probyn (2016, 13) cites: ‘These women attest to the dwindling stock long before the closing of the fishery. They were not listened to. Perhaps even more galling is that in the aftermath of the crisis, their insights about how to better manage the fishery went unheard.’ Similarly, Caiçara women told the author stories about their childhood fishing experiences and compared the small catches these days with the memories of the vastly more plentiful hauls in their past. Red snapper, hake, bonito and tuna were all mentioned as favourite fish in rapidly declining catches.

¹⁶ As Le Sann notes (1998, 7), the closer one gets to the equator, the greater the diversity in numbers of fish species, but the population of each is much smaller than in more temperate waters.

Alcatrazes has almost 1,300 species of tuna, 100 species of birds, and 259 species of fish. (ICMBIO- Instituto Chico Mendes de Conservação do Biodiversidade, Ministério Do Meio Ambiente, 2018).

¹⁷ Phenology centres and projects are emerging as Citizen Science grows in its spread of observation posts and accumulation of metadata.

¹⁸ Video recorded interview, Ilhabela, Jan 2020.

¹⁹ Food and Agriculture Assoc. of the United Nations. Available from: <http://FOA.org/fishery/fact/BRA/en>. [Accessed 6 Jan, 2019]

²⁰ Available from: <http://www.phys.org>, published 9 April 2013. [Accessed 6 Jan, 2019]

²¹ Zanardi-Lamardo, E., Bicego, M., and Weber, R., 2013. ‘The Fate of an Oil Spill in São Sebastião Channel: A Case Study’. *Brazilian Journal of Oceanography*, 61(2): 93-104. 203. “The data showed that the aliphatic hydrocarbon analyses were powerful tools for the assessment of the fate of the oil spill and that the northern part of the São Sebastião Channel is more subject to the effects of oil spills.”

²² *Fifth National Report to the Convention on Biological Diversity: BRAZIL*, 2015. Ministry of The Environment, Secretariat of Biodiversity and Forests. Available from:

<https://www.cbd.int/doc/world/br/br-nr-05-en.pdf> [Accessed 6 Jan. 2019], and

Fifth National Report to the Convention on Biological Diversity, 2017. Ministry of the Environment (Brazil). Available from: <https://www.cbd.int/doc/world/br/br-nbsap-v3-en.pdf>. [Accessed 6 Jan. 2019].

²³Population Pyramid, 2019. Available from: <https://www.populationpyramid.net/population-density/brazil/2019>. [Accessed 22 July, 2019].

²⁴President Bolsonaro ‘declares war’ on Brazil’s indigenous peoples- Survival responds, 9 Jan 2019. Available from: <https://survivalinternational.org/news>. [Accessed 9 Jan. 2019].

²⁵“The landings of the artisanal fleet mainly supply the internal market for direct consumption, fresh or refrigerated.” Available from: <http://www.fao.org/fi/oldsite/FCP/en/BRA/profile.htm>. [Accessed 22 July 2019].

²⁶ It is interesting to note that this is also similar to the Gurage (Ethiopic) word ‘aysarä’, meaning “the stick of bamboo used to stretch cloth and measure it during weaving.” W. Leslau, *Etymological Dictionary of the Gurage (Ethiopic)*, Vol. 1 (Weisbaden: Otto Harrassowitz: 1979). Bamboo in this case is the material common denominator in a name that has crossed continents.

²⁷ Juninho Caiçaras, in Amigo, ‘For the Caiçaras’, 2018

²⁸ Article 225. Title VIII, Chapter VI, states: ‘All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations.’

²⁹ Poteete, et al., 2010. *Working Together*. 266. Quoted at length here to underline the need for multidisciplinary investigation.

³⁰ Albagli, S, Parra, H. Fonseca, F. and Maciel, M.L. ‘Open Science and Social Change: A Case Study in Brazil’ in *Contextualising Openness* (Chan, 2019), which ‘aims to stimulate further research and debates about how to collectively design a knowledge system that is open and equitable for all.’

³¹ Rachel Biderman, Director for World Resources Institute Brazil, *World Resources Institute, Sao Paulo, Brazil*. @rachel_biderman (15 Dec. 2018). ‘In the past, radio units were installed in some indigenous communities in the Brazilian Amazon and they did wonders. I think the more we invest in getting low cost tech resources like this to people living in forests, the more we will get in return to fight deforestation. There are 20 million people living in the Brazilian Amazon, we should support their role in protecting their forests. They are the best park rangers as their cultures and livelihoods depend on healthy forests. Yet support rarely reaches them...’ (Biderman, 2018). The same can be said for the *Caiçara* for the fish.

³² ‘The Indigenous peoples defend the Earth’s biodiversity – but they’re in danger’ (*National Geographic*, 16 Nov 2018). Available at: <https://www.nationalgeographic.com/environment/2018/11/can-indigenous-land-stewardship-protect-biodiversity>. [Accessed 15 Dec. 2018]. Also, ‘How to stop deforestation: ‘Indigenous people are the best park rangers’ *The Guardian*, (4 April 2017.) Available at: <https://www.theguardian.com/global-development-professionals-network/2017/apr/04/how-to-stop-deforestation-indigenous-people-are-the-best-park-rangers>. [Accessed 15 Dec. 2018]. ‘In some places, such as Brazil and Indonesia, the amount spent by their governments on subsidising agriculture is more than 100 times higher than the international funding provided to those countries for forest conservation.’

³³ Atevi_meio_ambiente. Available at: <https://www.instagram.com/p/Bzg978Sn1FU> [Accessed 23 July 2019].

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List of Illustrations:

Fig. 1: Map of Ilhabela

Fig. 2: The *Caiçara* circle fishing technique, with nets being raised to bring in the catch. This technique was brought to Brazil by Japanese fishermen. Photo: C. Baeumler, 2018.

Fig. 3, A daily catch on Ilhabela: the larger fish in the foreground are called *Bonito* ('beautiful'), and belong to the tuna family, and the smaller fish with gold are called *Pampo*, also known as Palm and Pork fish in Portuguese. Photo: M. Modeen, 2018.

Fig. 4, the *Caiçara* fishing life, here showing *Praia de Serraria* from the village view, situated behind trees on a fresh water river, and the Atlantic facing beach with boats in the distance. Photo: C. Baeumler, 2018.

Fig.s 5a and 5b. – Drawn illustrations of the circle net techniques, top view and side view, Illustrations: Laelcio Pereria Da Silva, 2019. B&W

Fig. 6. Nets drying on *Praia Vermelha*. Photo: M. Modeen. 2018

Fig 7, *Espada* fish on the dock, about to be fileted by the *Caiçara* fisherman. Photo: M. Modeen, 2018.

Fig. 8, A family dwelling with house and pier, near the scallop farm initiated by Ilhabela resident, Daniel Carvalho Rodrigues. Photo: M. Modeen, 2018.

Fig. 9, *Caiçara* canoes, on the beach of Villa, Ilhabela, brightly painted. They are now considered a patrimony or legacy to sons or grandsons since the prohibition of cutting trees for their production. Photo: M. Modeen, 2019.

Fig. 10, Composite images of oil spill residues that have congealed into a sticky mass, killing fish and marine life. The oil is whipped into foam by wind and waves, and the longer it floats, the more it turns into a tar-like sticky mass. Photos by M. Modeen and Francisco Da Silva, 2018.

Fig. 11, In the centre of this photo is the inflatable oil ring, in the São Sebastião Channel. Photo by Laelcio Da Silva, Dec. 2018. B&W

Fig.12, *Caiçara* youth spend most days on or in the water. Canoes, motorboats, skiffs or shrimp boats are all central to the activities in their work and play; as adults these same skills are essential to the community's survival. Photo: M. Modeen, 2018.

Fig. 13, sun on the water, ubiquitous boats and distant islands constitute the daily landscape of the *Caiçaras*. Photo: M. Modeen, 2018. B&W

Fig. 14, Bonete, a *Caiçara* village from above, showing the typical beach setting and fresh water river flowing into the sea. Photo: Francisco Da Silva, 2018.

Fig.15, Castelhanos Beach, seen from the hills above. Photo: Fran Pereria Da Silva, 2018.

Fig.16, Francisco Pereira Da Silva (left), eco-guide and professional diver, and his brother, Laelcio Pereira Da Silva (right), fisherman, wearing handmade woven reed hats. Photo: M. Modeen, 2018.

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Biographical Notes:

Professor Mary Modeen is Chair of Interdisciplinary Art Practices at the University of Dundee, Scotland. As an artist/academic, she lectures in Art and founded the MFA in Art & Humanities in Dundee. Her research has several threads: perception as a cognitive and interpretive process, and place-based research, which connects many of these concerns, with attention to cultural values, history and embodied experience. As such, this research is usually interdisciplinary. Part of this work appears as creative art, and part as writing and presentations. Cultural values and individual differences are inherent in these investigations. Modeen is also the Associate Dean for Internationalisation for DJCAD and the School of Humanities, and Coordinates PhD studies in the College of Art and Design.

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Professor Christine Baeumler is an artist and activist in the Art Department of the University of Minnesota Minneapolis/St. Paul (USA) who explores the intersection of the environment, history and community. She works on projects that engage community efforts to create welcoming places - a form of public art with a social dimension. These activities concern reclaiming both the natural environment and acknowledging local history. The transformation of a site into a place involves a collaborative process. She works with other artists, residents, city workers, community groups, arts organizations and local businesses. The authorship is shared with many individuals who have contributed to the design and implementation of her various projects.

Dr Heather Yeung, Co-Investigator, is a specialist in literature of the environment, a poet and eco-critic, and is a colleague based in the School of Humanities at the University of Dundee. She accompanied Modeen on one of the trips to Ilhabela and is part of the interdisciplinary research team that is building future projects for collaborative work with the *Caiçara*.

Sam Gonçalves is a documentary filmmaker, dual national Brazilian/UK, and an alumnus of the University of Dundee. Originally from Sao Paulo, he accompanied Modeen on the third trip and video recorded interviews with the *Caiçara* people. He is collaborating with the team to make a documentary film.